Medical Science

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DISCOVERY
SCIENTIFIC SOCIETY

A cross-sectional study of perceived stress caused by COVID-19 pandemic and the coping skills used by health care professionals of a government medical college from central India

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ABSTRACT

Introduction: Novel corona virus has spread rapidly which created a crisis
situation and took toll of lots of people all over the world. This sudden
upsurge of patients with high infectivity rate and unexpected complications
placed health care system under burden all over the world. Particularly at
places like India, where there was scarcity of resources and health care
professionals more stress was expected. Although there was enormous stress,
yet the individual perception varies and accordingly coping strategies also.
Aim: So, we tried to assess the perceived stress and coping strategies used by
health care professionals during COVID-19 pandemic. *Methods:* We collected
data of 153 participants by using Perceived Stress scale and Brief COPE scale.
Data was analyzed using Mann Whitney U test and Spearman's correlation
coefficient. *Results:* We found high levels of perceived stress among 18-45
years age group when compared to older population. We found more use of
total avoidant coping style and humor among participants staying alone than
those staying with families. We also found more use of coping style humor
among males and younger population. We found more use of coping style
religion among females and participants staying with family. We found
positive but weak correlation between perceived stress and total avoidant
coping styles. *Conclusion:* Present study highlighted the need of support
groups and special training programs for health care professionals to deal
with the pandemic stress. We also recommend workshops for promoting
positive coping strategies among health care professionals so that they can
deal with stressful conditions of the pandemic in better ways.

Keywords: COVID-19, Stress, Coping, Physicians.

1. INTRODUCTION

In 2019 a novel Coronavirus was detected in China and very soon the whole world was affected. The World Health Organization declared a state of pandemic soon. Nearly whole world faced medical emergency. First case of COVID-19 in India was found in Kerala in January 2020. Ever since, our lives have changed drastically. Since March 2020 the pandemic took a fierce course in India and entire country was placed in lockdown. Government took extraordinary measures to limit the spread of virus. The outbreak of the coronavirus disease 2019 and its rapid spread have created unpredictable challenges to health care systems. Health professionals were forced to mobilize all their resources in a situation of uncertainty. As a result mental health of health care workers treating patients of COVID-19 was put under strain (El-Hage et al., 2020). Due to restrictions of movement and social contacts, everyone's life changed drastically. However, healthcare professionals have no excuse rather than to work continuously in such a critical situation. They were themselves under the risk of infection by COVID-19 as well as spreading it to the near and dear ones. This makes them more vulnerable to develop psychological stress and other mental health issues (Lai et al., 2020; Tian et al., 2020). Health care workers were facing the ongoing uncertainty about resources, capacities, and risk of infection and subsequent death. These conditions induced high levels of fear and anxiety, and particularly related to persistent stress exposure syndromes and work place burnout in the long term.

The disease characteristics of the COVID-19 pandemic produced a situation of uncertainty, particularly among health care workers, due to various reasons such as high infectivity, the severity of symptoms it can cause in a segment of population, continuously changing recommended treatment course, and the deaths among health care professionals. Pandemic has led to increased burden on our already compromised public health care system. Stress was also increased by the reasons such as scarcity of personal protection equipment, worries about not being able to provide adequate care if deployed to other area, lack of proper communication, paucity of specific drugs, and the shortage of intensive care unit beds, staff and machineries needed for critically ill patients. Further the risk factors that were identified were being isolated, feelings of uncertainty, social stigmatization, overwhelming workload and facing the critically infected colleague's condition and their deaths. So, health care professionals are vulnerable to high levels of stress, depression, anxiety, addiction, post-traumatic stress disorder and burnout which can lead to full blown psychiatric disorders in them (El-Hage et al., 2020; Alotaybi et al. 2021; Binnwejim & Alhumade, 2021). Direct involvement in patient's treatment, feelings of isolation during quarantine and perceived health risks further exaggerate the risks arising out of epidemics (Mulfinger et al., 2020).

Although the health care workers were appreciated at certain places, however the incidences of being stigmatized from society for working in COVID dedicated hospitals also took place (Koh et al., 2005). This stigma add on to the stress levels of medical and paramedical professionals, thereby affecting factors like job satisfaction and quality of healthcare services (Hernandez et al., 2016). Moreover, this stigma led to an increase in violence against health care workers. More than 200 attacks were reported during the ongoing pandemic by May 2020 (Bagcchi, 2020). Some were denied to use public transport, and some were expelled from their rented houses and even physically harmed (Bagcchi, 2020). Stress refers to "the bodily processes which result from situations that place physical or psychological demands on an individual person" (Selye, 1973); although some stress can excel the performance, it becomes distressed when it is in excess of individual's ability to cope (Folkman & Lazarus, 1988).

During the past epidemic studies, increased stress was reported by healthcare professionals (Tam et al., 2004; Lee et al., 2018). The influence of this emergency on healthcare professionals heightened their stress levels and this could be associated with other factors like anxiety and depression (Verma et al., 2004; Liu et al., 2012). Enormous levels of stress can be considered as a significant factor that affects adversely work environment and deteriorates performance, especially during an emergency (Müller et al., 2009). Although the stress affects almost all, however individual perception varies and so the coping strategies also (Folkman, 2010). This relationship between stress and coping strategies was studied previously (Phua et al., 2005; Khalid et al., 2016; Cai et al., 2020). Coping strategies refer to behavioral and cognitive efforts that help individuals to combat the stress (Folkman and Lazarus, 1985), and are used when its demands exceed individual resources (Martínez et al., 2020). Specific coping strategies helped to reduce the stress (Yin et al., 2018; Martínez et al., 2020).

Rationale for the present study

On reviewing the literature, we found that there was paucity of research in India related to COVID-19 induced stress and coping strategies used by the health care professionals to combat the stressful situation of COVID-19 pandemic. So, the present study was conducted to understand the link between COVID-19 induced stress and the various coping methods used by health care professionals working actively in the care of patients suffering from coronavirus disease.

Research question

What is perceived stress and which are the coping skills used by health care professionals during COVID-19 pandemic?

Aim of the present study

The aim of present study was to study the perceived stress caused by COVID-19 pandemic and the coping skills used by health care professionals to combat that stress.

Pre-specified hypothesis of the study

Based on the previous study on resident doctors from South India where higher levels of stress was associated with the use of maladaptive coping styles (Sreelatha et al., 2019), we hypothesized that the lower levels of stress will be associated with positive strategies (such as problem solving, social support, turning to religion and positive attitude), and higher levels of stress will be associated with avoidance coping strategies.

2. METHODOLOGY

Study design

The present study was cross-sectional in nature.

Study setting, location, and relevant dates

Present study was carried out by the Department of Psychiatry of a government medical college from the Maharashtra state of India which was a COVID dedicated hospital. It was conducted over a period of 2 months from February 2021 to March 2021.

Eligibility/ inclusion criteria for study participants and sources and methods of selection of study participants

Present study involved health care professionals fulfilling inclusion criteria like those who were working at specified government medical college for a period of at least 3 months, those who belonged to age range of 18 to 60 years, those who belonged to either of the genders, and those who consented to participate in the study. Exclusion criteria adopted for the present study were those health care professionals who were not willing to participate in the study and those who worked for a period of less than 3 months in the above mentioned hospital.

Data sources/measurement

A socio-demographic history was collected after interviewing the participants and details of the same were entered in a semi-structured pro-forma (case record form). Perceived stress scale-10 item (PSS-10 – English version) and Brief-COPE Scale (English version) were used to measure the perceived stress and coping strategies respectively. Study was carried out as per the ethical guidelines and all the data collected was kept confidential.

PSS-10 is a 10-item self-report scale which is commonly used to measure the degree of perceived stress (Cohen et al., 1983). Out of the 10 items, six items are negatively stated and four items are positively stated. Every item is scored on a Likert scale with 5 points (0 to 4), of which score of 0 indicates a response of "never" and a score of 4 indicates a response of "very often". The overall score on PSS-10 ranges from 0 to 40. Greater scores indicate greater level of the perceived stress (Cohen et al., 1983). Cronbach's alpha of PSS-10 was found to be .884 (Babore et al., 2020).

Brief-COPE is a 28-item self-report questionnaire which is commonly used to assess both ineffective as well as effective coping styles with respect to the stressful situations of the life (Carver et al., 1989). This questionnaire assesses an individual's primary coping methods – either avoidant coping or approach coping (Eisenberg et al., 2012). It consists of the sub-scales such as Active coping, Self-distraction, Substance use, Denial, Use of instrumental support, Use of emotional support, Venting, Behavioral disengagement, Planning, Positive reframing, Acceptance, Humor, Self-blame, and Religion. Brief-COPE is a valid questionnaire with adequate factorial structure (Carver, 1997). Data were collected from the study participants by using convenient sampling method.

Bias

The present study was voluntary and was conducted after obtaining the consent from the study participants. None of the study participants were provided any incentives in any form for the participation in the study. The present study was conducted by using

the English language version of above mentioned scales in the population who was well versed in English language. Data was collected from each study participant only once to prevent the duplication of the responses.

Sample size

We collected data from total 191 participants out of which responses from 38 were incomplete. So, 153 participants were included in the study according to above selection criteria.

Statistical analysis

Statistical analysis was done by using MS Excel and PSPP software. Qualitative data such as sex was expressed using descriptive statistics. Comparison of perceived stress scale score and coping styles along with different factors like living with or without family members, number of months of working in COVID designated center, type of contact and suffered from COVID or not, was done by using Mann Whitney U test. The correlation between perceived stress scale score and different coping styles was established using Spearman's correlation coefficient. P value of < 0.05 was considered significant.

3. RESULTS

Distribution of socio-demographic variables

Table 1 shows that majority of the participants were from an age group of 18 to 30 years (56.3%), were males (52.3%), were married (49.7%), were living with the family (55.6%), belonged to the nursing profession (28.1%), were working in care of COVID-19 patients for more than 6 months period (82.4%), had direct contact with COVID infected patients (92.8%), not suffered from COVID-19 infection (76.5%), and do not have a family history of COVID-19 infection (81.7%).

Table 1 Socio-demographic variables among study participants (n = 153)

Socio-demographic variable		n (%)
Age Groups (in years)	18 to 30	86 (56.3)
	31 to 45	55 (35.9)
	46 to 60	12 (7.8)
Gender	Male	80 (52.3)
	Female	73 (47.7)
Relationship Status	Married	76 (49.7)
	Separated	2 (1.3)
	Single	75 (49.0)
Type of Living	Alone	68 (44.4)
	With Family	85 (55.6)
Profession	Lab Staff	11 (7.2)
	Staff Nurse	43 (28.1)
	Intern	36 (23.5)
	Resident	36 (23.5)
	Faculty	27 (17.7)
Number of months working in care of patients with COVID-19 infection	3 to 6 Months	27 (17.6)
	>6 Months	126 (82.4)
Type of contact with patients infected with COVID-19	Direct	142 (92.8)
	Indirect	11 (7.2)
Suffered from COVID-19	Yes	36 (23.5)
	No	117 (76.5)
Family member(s) suffered from COVID-19	Yes	28 (18.3)
	No	125 (81.7)

Comparison of stress and copings among different age groups

Table 2 & figure 1 shows that, higher levels of perceived stress were found among an age group of 18 to 30 years (mean ranks = 78.3, IQR= 8) when compared to an age group 46 to 60 years (mean ranks= 51.1, IQR= 7.5) (F= -1.989, P= 0.047). There was no significant difference regarding the use of any particular coping style when compared between the age groups of 18 to 30 years and 46 to 60 years.

Table 2 Comparison among age groups (18 to 30 years versus 46 to 60 years)

	18 to 30 Years			46 to 60 Years			F	P value
	Median	Mean Ranks	IQR	Median	Mean Ranks	IQR		
PSS Score	18.0	78.3	8.0	15.0	51.1	7.5	-1.989	0.047
Active Coping	5.0	72.7	2.0	5.0	68.5	3.8	-0.353	0.724
Emotional Support	4.0	78.8	3.0	4.5	75.9	3.8	-0.215	0.830
Info Support	4.0	77.6	2.3	4.0	71.9	2.0	-0.411	0.681
Positive Reframing	5.0	77.7	2.0	6.0	102.4	2.8	-1.847	0.065
Planning	5.0	78.1	2.3	5.0	74.0	2.5	-0.297	0.766
Acceptance	5.5	77.2	1.3	5.5	83.4	2.5	-0.421	0.673
Total Approach	28.0	77.1	10.3	30.5	83.5	8.5	-0.488	0.625
Self-Distraction	5.0	81.2	2.0	4.5	69.5	3.3	-0.875	0.381
Denial	3.0	76.1	2.0	4.0	93.5	3.5	-1.270	0.204
Substance Use	2.0	77.4	1.0	2.0	78.4	1.5	-0.104	0.918
Behavioral Disengagement	4.0	83.4	3.0	4.0	85.0	2.5	-0.095	0.924
Venting	4.0	76.7	2.0	4.5	79.3	3.0	-0.178	0.859
Self-Blame	3.0	82.2	2.0	2.5	65.3	1.0	-1.359	0.174
Total Avoidant	21.5	82.1	7.0	21.0	78.6	8.8	-0.212	0.832
Humor	3.5	84.9	3.0	3.5	87.0	3.0	-0.179	0.858
Religion	4.0	69.1	2.0	5.5	94.4	2.0	-1.853	0.064

Comparison of stress and copings among different age groups

Table 3 & figure 1 show that, higher levels of perceived stress were found among an age group of 31 to 45 years (mean ranks = 80.7, IQR= 7) when compared to an age group of 46 to 60 years (mean ranks= 51.1, IQR= 7.5) (F= -2.089, P= 0.037). There was significantly more use of coping style positive reframing among an age group of 46 to 46 years as compared to an age group of 31 to 45 years (F = -2.294, P = 0.022).

Table 3 Comparison among age groups (31 to 45 years versus 46 to 60 years)

	31-45 Years			46-60 Years			F	P value
	Median	Mean Ranks	IQR	Median	Mean Ranks	IQR		
PSS Score	19.0	80.7	7.0	15.0	51.1	7.5	-2.089	0.037
Active Coping	6.0	85.6	3.0	5.0	68.5	3.8	-1.170	0.242
Emotional Support	4.0	74.5	2.0	4.5	75.9	3.8	-0.100	0.920
Info Support	4.0	77.2	3.0	4.0	71.9	2.0	-0.410	0.682
Positive Reframing	5.0	70.4	2.0	6.0	102.4	2.8	-2.294	0.022
Planning	5.0	75.9	2.0	5.0	74.0	2.5	-0.150	0.881
Acceptance	5.0	75.2	3.0	5.5	83.4	2.5	-0.643	0.520
Total Approach	28.0	75.4	11.0	30.5	83.5	8.5	-0.549	0.583
Self-Distraction	5.0	72.1	2.0	4.5	69.5	3.3	-0.184	0.854
Denial	3.0	74.8	2.0	4.0	93.5	3.5	-1.426	0.154

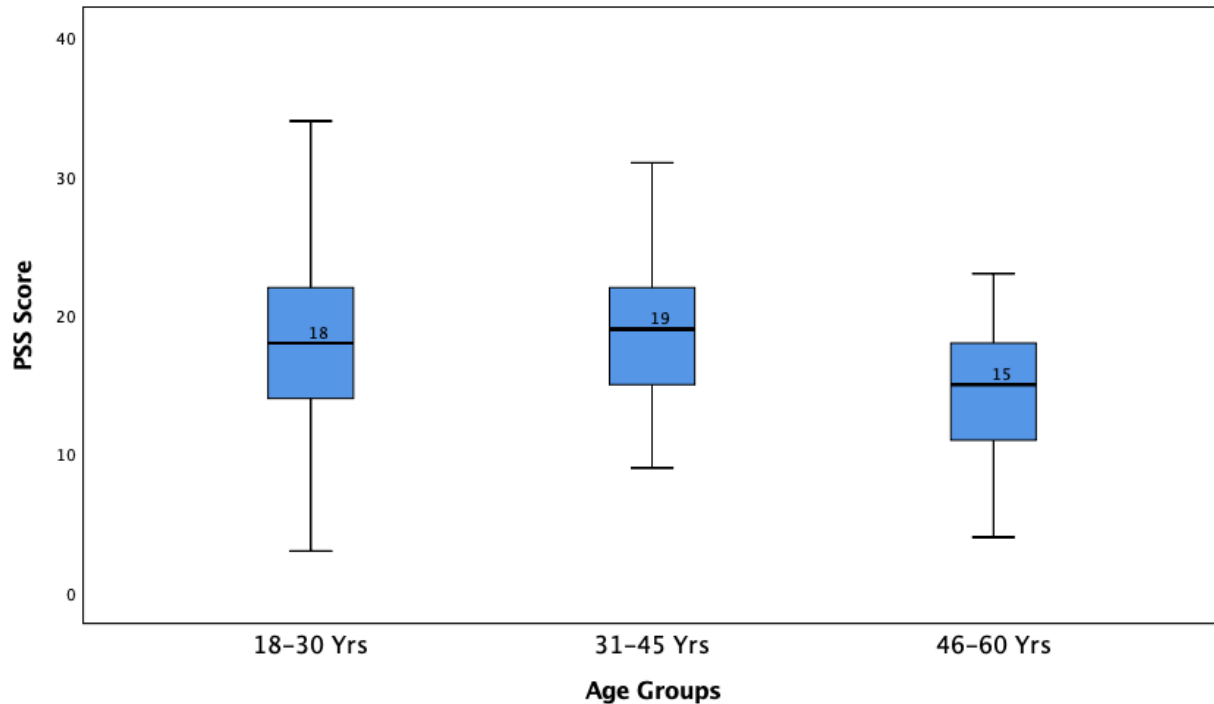|								
Subs Use	2.0	76.1	1.0	2.0	78.4	1.5	-0.203	0.839
Beh Disengagement	3.0	65.2	2.0	4.0	85.0	2.5	-1.490	0.136
Venting	4.0	77.1	2.0	4.5	79.3	3.0	-0.184	0.854
Self-Blame	3.0	71.5	3.0	2.5	65.3	1.0	-0.352	0.725
Total Avoidant	20.0	68.6	7.0	21.0	78.6	8.8	-0.639	0.523
Humor	2.0	62.4	2.0	3.5	87.0	3.0	-1.862	0.063
Religion	5.0	85.5	3.0	5.5	94.4	2.0	-0.682	0.495

Figure 1 Comparison of PSS-10 Scores among different age groups (values inside the figure indicates mean scores for the respective age groups)

Comparison of stress and copings among different age groups

Table number 4 shows that there was no significant difference in perceived stress levels according to the age groups (18 to 30 years versus 31 to 45 years) (F = -0.320, P = 0.749). There was significantly more use of coping style humor among an age group of 18 to 30 years as compared to an age group of 31 to 45 years (F= -3.102, P= 0.002). There was also more use of the coping style behavioral disengagement among an age group of 18 to 30 years as compared to an age group of 31 to 45 years. (F = -2.448, P = 0.014). We found significantly more use of coping style religion among an age group of 31 to 45 years as compared to an age group of 18 to 30 years (F= -2.187, P= 0.029). We did not found any significant difference in total approach coping style (F= -0.239, P= 0.811) and total avoidant coping style (F= -1.788, P= 0.074) according to the age groups.

Table 4 Comparison among age groups (18 to 30 years versus 31 to 45 years)

	18-30 Years			31-45 Years			F	P value
	Median	Mean Ranks	IQR	Median	Mean Ranks	IQR		
PSS Score	18.0	78.3	8.0	19.0	80.7	7.0	-0.320	0.749
Active Coping	5.0	72.7	2.0	6.0	85.6	3.0	-1.736	0.083
Emotional Support	4.0	78.8	3.0	4.0	74.5	2.0	-0.571	0.568
Informational Support	4.0	77.6	2.3	4.0	77.2	3.0	-0.067	0.946
Positive Reframing	5.0	77.7	2.0	5.0	70.4	2.0	-0.972	0.331

Planning	5.0	78.1	2.3	5.0	75.9	2.0	-0.288	0.773
Acceptance	5.5	77.2	1.3	5.0	75.2	3.0	-0.254	0.799
Total Approach	28.0	77.1	10.3	28.0	75.4	11.0	-0.239	0.811
Self-distraction	5.0	81.2	2.0	5.0	72.1	2.0	-1.200	0.230
Denial	3.0	76.1	2.0	3.0	74.8	2.0	-0.162	0.871
Subs Use	2.0	77.4	1.0	2.0	76.1	1.0	-0.223	0.824
Behavioral Disengagement	4.0	83.4	3.0	3.0	65.2	2.0	-2.448	0.014
Venting	4.0	76.7	2.0	4.0	77.1	2.0	-0.061	0.952
Self-blame	3.0	82.2	2.0	3.0	71.5	3.0	-1.425	0.154
Total Avoidant	21.5	82.1	7.0	20.0	68.6	7.0	-1.788	0.074
Humor	3.5	84.9	3.0	2.0	62.4	2.0	-3.102	0.002
Religion	4.0	69.1	2.0	5.0	85.5	3.0	-2.187	0.029

Comparison of stress and copings among male and female study participants

Table 5 shows that significant difference in perceived stress was not found according to gender differences (F= -0.56, P= 0.574). We did not found any significant difference in total approach coping style (F= -0.06, P= 0.950) and total avoidant coping style (F= -0.08, P= 0.936) according to gender difference. We found significantly more use of coping style humor in males as compared to females (F= -2.02, P= 0.043). We found significantly more use of coping style religion in females as compared to males (F= -2.22, P= 0.027).

Table 5 Comparison between males and females on the basis of Relationships Brief COPE and PSS

	Male			Female			F	P value
	Median	Mean Ranks	IQR	Median	Mean Ranks	IQR		
PSS Score	18.00	78.9	7.75	18.00	74.9	7.50	-0.56	0.574
Active Coping	5.00	74.9	2.00	5.00	79.3	2.00	-0.62	0.534
Emotional Support	4.00	76.9	3.00	4.00	77.2	3.00	-0.04	0.967
Informational Support	4.00	76.0	2.00	4.00	78.1	2.50	-0.31	0.759
Positive Reframing	5.00	76.1	2.00	5.00	78.0	2.00	-0.27	0.786
Planning	5.00	77.6	2.00	5.00	76.4	3.00	-0.17	0.869
Acceptance	6.00	81.4	2.00	5.00	72.1	2.00	-1.33	0.185
Total Approach	29.00	76.8	10.00	29.00	77.2	10.50	-0.06	0.950
Self-Distraction	5.00	79.6	2.00	4.00	74.1	3.00	-0.78	0.437
Denial	3.00	74.4	2.00	4.00	79.8	2.00	-0.78	0.436
Substance Use	2.00	83.3	1.00	2.00	70.1	0.00	-2.37	0.018
Behavioral Disengagement	3.00	75.9	3.00	3.00	78.2	2.00	-0.33	0.741
Venting	4.00	77.2	2.00	4.00	76.8	2.00	-0.06	0.952
Self-Blame	3.00	78.0	2.00	3.00	75.9	2.00	-0.30	0.767
Total Avoidant	21.00	77.3	6.75	21.00	76.7	7.00	-0.08	0.936
Humor	3.50	83.6	2.00	2.00	69.8	2.00	-2.02	0.043
Religion	4.00	69.5	2.00	5.00	85.2	3.00	-2.22	0.027

Comparison of stress and copings with type of living (Alone versus Family setting)

Table 6 shows that no significant difference in perceived stress was found according to staying alone and staying with family (F= -1.82, P= 0.069). We did not found any significant difference in total approach coping style according to staying alone and staying with family (F= -0.41, P= 0.679). We found significantly more use of total avoidant coping style among participants staying alone when compared with those staying with family (F= -3.00, P= 0.003). We found significantly more use of coping style humor among participants staying alone when compared with those staying with family (F= -2.91, P= 0.004). We found significantly more use of

coping style religion among participants staying with family compared with those staying alone (F= -2.04, P= 0.041). Apart from these, active coping was more used by the participants living with family (F= -2.48, P= 0.013), whereas coping styles like self-distraction (F= -2.52, P= 0.012), behavioral disengagement (F= -2.56, P= 0.011), and self-blame (F= -2.93, P= 0.003) were more used by the participants who were staying alone.

Table 6 Comparison between Living status (Alone versus with family) on the basis of Relationships Brief COPE and PSS

	Alone			With Family			F	P value
	Median	Mean Ranks	IQR	Median	Mean Ranks	IQR		
PSS Score	18.0	84.3	9.0	18.0	71.2	7.5	-1.82	0.069
Active Coping	5.0	67.2	2.0	6.0	84.8	3.0	-2.48	0.013
Emotional Support	4.0	83.4	2.0	4.0	71.9	2.0	-1.61	0.107
Informational Support	4.0	80.2	3.0	4.0	74.5	2.0	-0.81	0.416
Positive Reframing	4.0	74.1	2.0	5.0	79.3	2.0	-0.74	0.461
Planning	5.0	75.9	2.0	5.0	77.9	2.0	-0.29	0.774
Acceptance	5.0	72.1	2.0	6.0	80.9	2.5	-1.24	0.215
Total Approach	28.0	75.3	10.8	30.0	78.3	11.0	-0.41	0.679
Self-Distraction	5.0	86.9	2.0	4.0	69.0	2.0	-2.52	0.012
Denial	3.0	77.5	2.0	3.0	76.6	2.0	-0.12	0.906
Substance Use	2.0	80.1	1.0	2.0	74.5	0.0	-1.00	0.318
Behavioral Disengagement	4.0	86.9	2.8	3.0	69.1	2.0	-2.56	0.011
Venting	4.0	79.4	2.0	4.0	75.1	2.0	-0.61	0.541
Self-Blame	3.0	88.2	3.0	3.0	68.0	1.5	-2.93	0.003
Total Avoidant	23.0	89.0	6.8	20.0	67.4	6.0	-3.00	0.003
Humor	4.0	88.1	2.0	2.0	68.1	2.0	-2.91	0.004
Religion	4.0	68.9	2.0	4.0	83.4	3.0	-2.04	0.041

Correlation between stress and coping skills among the study participants

Table 7 & fig 2 and 3 show the correlation between perceived stress scale scores and the coping styles and we found that there was positive but weak correlation between perceived stress scale and coping styles such as emotional support (Correlation coefficient= 0.244, P= 0.002), informational support (Correlation coefficient= 0.226, P= 0.005), self-distraction (Correlation coefficient= 0.251, P= 0.002), denial (Correlation coefficient= 0.267, P= 0.001), behavioral disengagement (Correlation coefficient = 0.316, P= 0.00006), venting (Correlation coefficient= 0.294, P= 0.0002), self-blame (Correlation coefficient= 0.233, P= 0.004), and total avoidant (Correlation coefficient= 0.446, P= 0.000).

Table 7 Correlation between PSS and Coping skills

Active Coping	Correlation Coefficient	-0.020
	p value	0.807
Emotional Support	Correlation Coefficient	.244**
	p value	0.002
Informational Support	Correlation Coefficient	.226**
	p value	0.005
Positive Reframing	Correlation Coefficient	-0.079
	p value	0.330
Planning	Correlation Coefficient	0.006
	p value	0.946
Acceptance	Correlation Coefficient	0.025

	p value	0.761
Total Approach	Correlation Coefficient	0.115
	p value	0.156
Self-Distraction	Correlation Coefficient	.251**
	p value	0.002
Denial	Correlation Coefficient	.267**
	p value	0.001
Substance Use	Correlation Coefficient	0.100
	p value	0.219
Behavioral Disengagement	Correlation Coefficient	.316**
	p value	0.00006
Venting	Correlation Coefficient	.294**
	p value	0.0002
Self-Blame	Correlation Coefficient	.233**
	p value	0.004
Total Avoidant	Correlation Coefficient	.446**
	p value	0.000
Humor	Correlation Coefficient	0.079
	p value	0.333
Religion	Correlation Coefficient	0.114
	p value	0.159
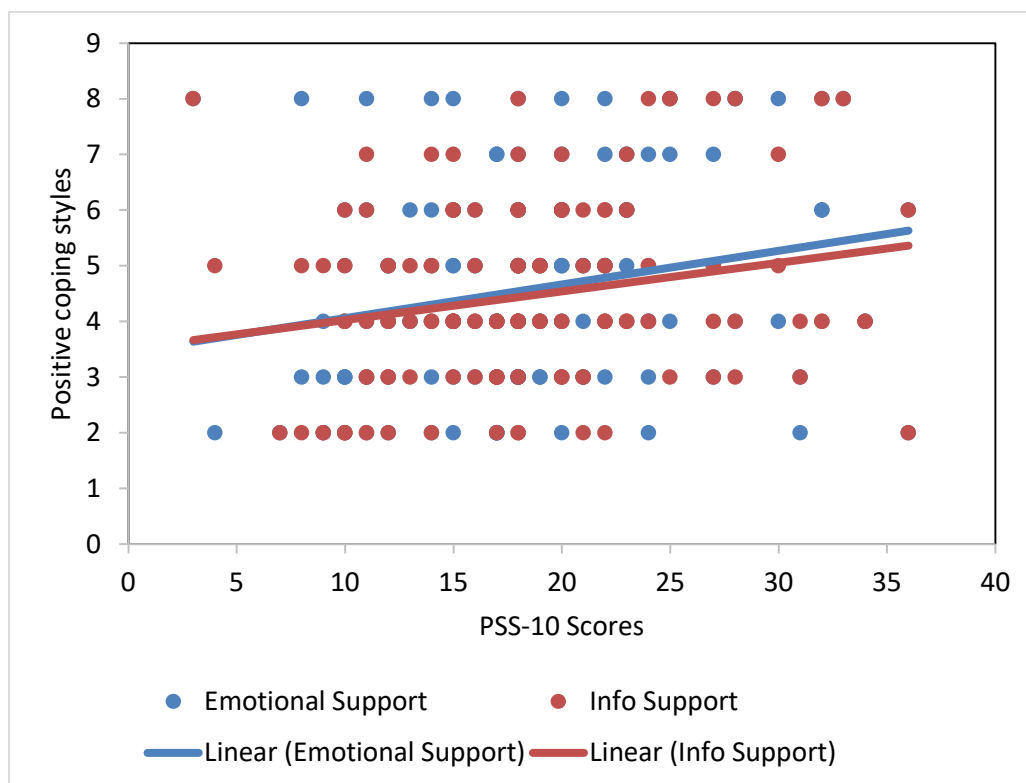
Figure 2 Correlations between PSS and Positive Coping Skills
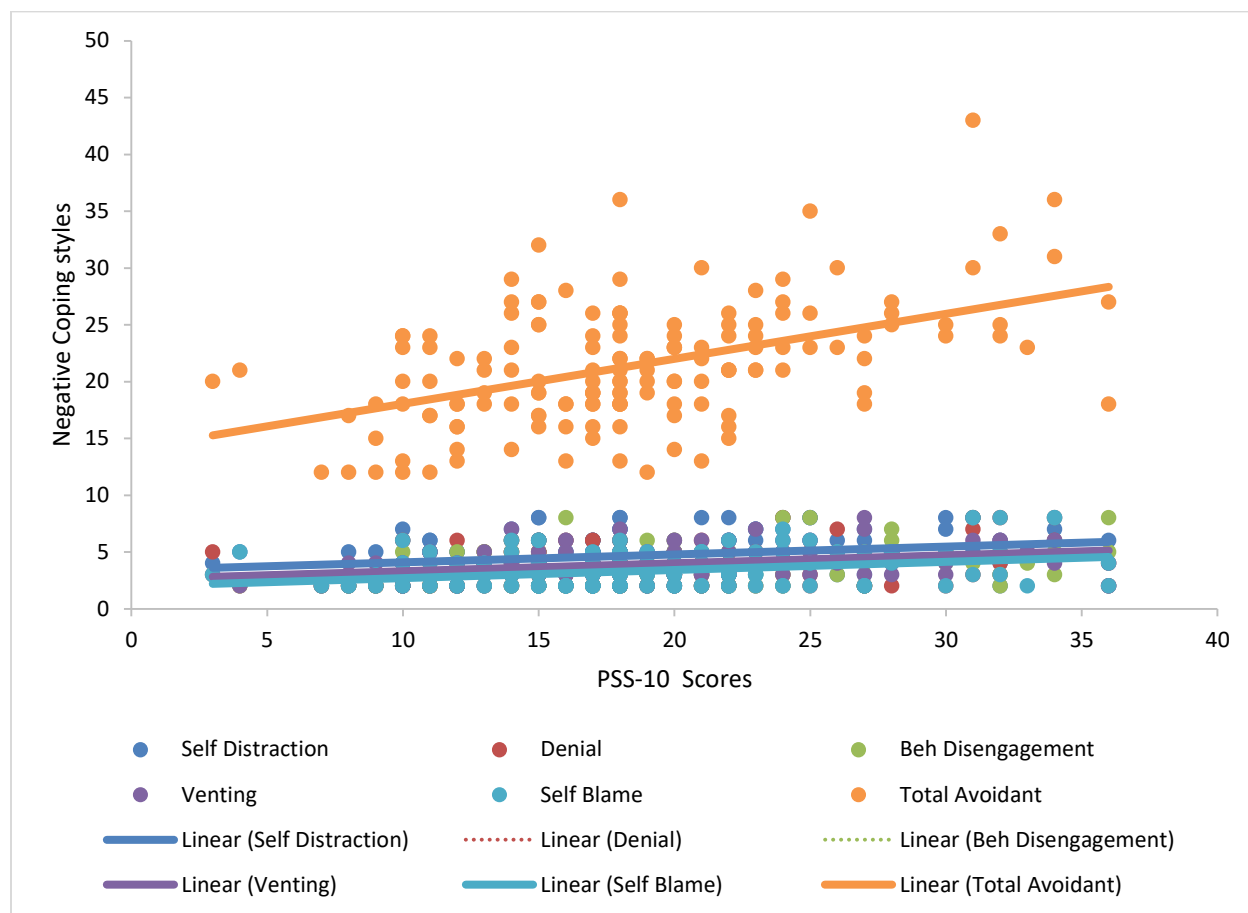
Figure 3 Correlation between PSS and negative coping skills

4. DISCUSSION

In this study, we studied the coping styles of Indian healthcare professionals to the COVID-19 pandemic induced stress who worked at a government medical college from Central India where there was a paucity of health care professionals. We investigated various factors (socio-demographic variables like age, gender, type of contact, number of months of work, staying alone or with family, suffered from COVID or not) for their any possible role in perceived stress among healthcare professionals and the type of coping strategies used by them in response to this stressful situation. Present study results may help in understanding the stress response of healthcare workers involved in treatment of the COVID-19 infected patients.

Correlation between socio-demographic variables and the perceived stress

Among socio-demographic variables, we found that the differences on perceived stress emerged among the age groups only. We found higher levels of perceived stress in age group 18-30 years than age group 46-60 years. Also higher levels of perceived stress were found in age group 31-45 years than age group 46-60 years. These results suggested that younger people were more vulnerable to the stress than elder ones; this was contrary to what we expected. We expected stress to be more in older population considering more seriousness and higher risk of complications due to coronavirus infection in elderly. We may say that older people handled situation in better way with minimal stress. One may say that more life experience makes them more resilient (Minahan et al., 2021). But this result may be due to comparatively less participants among age group 46-60 years than other age groups.

We did not found any significant difference in perceived stress according to gender difference. This result was inconsistent with the previous literature on the similar topics (Matud, 2004; West et al., 2018; Hirsch et al., 2020), with a study done in general population of Italy during the COVID-19 pandemic (Flesia et al., 2020), and also with the other normative data of Italy (Mondo et al., 2019). Also recent Italian study in health care professionals found the same (Babore et al., 2020). All these studies found that females showed higher levels of stress than males. We did not found any significant difference in perceived stress according to type of living (staying alone versus staying with family). Also we need to consider that many health care professionals chose to stay

away from their family members only during their working hours, living with family otherwise. So our result should be interpreted with caution and further research is needed.

There is no significant difference in perceived stress according to number of months of working. This may be due to lesser number of professionals in 3-6 months work group as compared to those in >6 months work group. So this requires further research to come to conclusion. We did not found any significant difference in perceived stress according to type of contact (direct versus indirect contact). This finding was inconsistent with recent study showing that perceived stress levels were higher in healthcare workers who were exposed more to COVID in comparison to less-exposed workers (Canestrari et al., 2021). This might be due to lesser number of professionals in indirect type of contact group as compared to those in the direct type of contact group of the present study. We did not found any significant difference in perceived stress according to the history of suffering from COVID-19 or not. This might be due to lesser number of persons who suffered from COVID-19 than those who did not suffered from COVID-19. So, present study findings must be compared by the further research on similar topic. Also at the time of present study, many healthcare professionals who suffered from COVID-19 improved completely without any serious complications which might explain this finding.

Correlation between socio-demographic variables and the coping styles

We did not found any significant difference in total approach coping style according to age groups, gender difference, staying alone and staying with family, number of months of working, type of contact, and the history of suffering from COVID-19. We found significantly more use of total avoidant coping style among participants staying alone when compared with those staying with family. This finding could be explained considering that family support system fosters positive coping strategies like problem solving rather than negative coping strategies like avoidance. Staying with family during crisis period boosts positive coping styles rather than avoidant coping styles. We did not found any significant difference in total avoidant coping style according to age groups, gender difference, number of months of working, type of contact, and the history of suffering from COVID-19.

We found significantly more use of coping style humor in an age group of 18-30 years as compared to an age group of 31-45 years. This finding was consistent with the studies showing that sense of humor declines with age (Svebak et al., 2010; Svebak et al., 2004; Greengross, 2013; Daniluk & Borkowska, 2017). We found significantly more use of coping style humor in males as compared to females. This finding was in line with the study which showed that people remember funny things as produced by males than that by females (Mickes et al., 2012). Both these findings were expected considering the nature of young generation, that the use of humor is more in young males. We found significantly more use of coping style humor among participants staying alone when compared with those staying with family. Also we need to consider that many health care professionals chose to stay away from their family members only during their working hours, living with family otherwise. So this finding should be considered with caution and should be compared by the further research.

We did not found any significant difference in coping style humor according to number of months of working, type of contact and suffered from COVID-19 or not. We found significantly more use of coping style religion among age group 31-45 years as compared to age group 18-30 years. We found significantly more use of coping style religion among the females as compared to the males. Both these results were expected as older persons (Revise Sociology, 2018), and females (Woodhead, 2012) are in general more religious. We found significantly more use of coping style religion among participants staying with family compared with those staying alone. This could be explained by our Indian culture where religious practices are generally used more in families. We did not found any significant difference in coping style religion according to number of months of working, type of contact, and the history of suffering from COVID-19.

Correlation between the perceived stress and coping styles

When we studied correlation between perceived stress and different coping styles, we found that healthcare professionals those were using more avoidant coping styles found to have high perceived stress. We found that among avoidant coping styles, they were more using self-distraction, denial, and behavioral disengagement, venting and self-blame. All of these had positive but weak correlation with the perceived stress. The finding about avoidance coping styles was in line with our expectation. Avoidant coping mechanisms are the part of dysfunctional reactions to the stressful situations. They are grouped so as it implies the likelihood with which people use avoidance strategies when exposed to challenging and stressful situations. This finding is consistent with Italian study which found that higher levels of avoidance strategies were linked with higher stress (Babore et al., 2020). This result was consistent with the previous study findings on relationship between coping and response to epidemics (Phua et al., 2005; Teasdale et al., 212). Similar result was shown by the study of coping styles in individuals with disability and chronic conditions also (Umucu & Lee, 2020). Japanese study on nurses had also shown similar findings (Tada, 2017). Avoidance coping is considered to be a type of

maladaptive coping as it often increases the stress without helping a person in dealing with the things that are actually causing themselves stressful (Dijkstra & Homan, 2016).

We did not found any significant correlation between perceived stress and total approach coping styles including active coping, positive reframing, planning and acceptance except for emotional support and informational support. Those using more emotional support and informational support were found to have more perceived stress. This was inconsistent with the findings of Italian study which found that the strongest protective factor against distress was a positive attitude (Babore et al., 2020). Previous studies also found that positive attitude at the workplace had maximum impact on reducing the stress (Khalid et al., 2016; Caiet al., 2020). This factor means a coping skill that helps people to consider negative situations positively, as it leads to greater psychological wellbeing and better quality of life (Flesia et al., 2020). Japanese study on nurses found that psychological distress was negatively associated with active coping (Tada, 2017). Here, we also need to consider the special situation of pandemic which led to lots of uncertainty, fear, and social distancing. In such environment getting emotional and informational support may be more frustrating at times. This result has to be considered cautiously as further research is needed to explore it.

We did not found any correlation among perceived stress and coping style religion. This was similar to the finding of an Italian study on healthcare professionals which also did not found any such correlation (Babore et al., 2020). Overall, the present study throws light on the importance and need of better coping strategies to be used in response to stressful situation of COVID-19 pandemic. Present study found that the stress was perceived more by the participants in 18-45 years age groups than the participants in an age group of 46-60 years. We found more use of total avoidant coping style among participants staying alone than those staying with family. We found more use of humor among 18-30 age group and males. We found more use of religion among 31-45 age group and females. We found that healthcare professionals those were using more avoidant coping styles, self-distraction, denial, behavioral disengagement, venting, self-blame, emotional support and informational support, found to have high perceived stress.

Limitations
Present study has a few limitations. Being a cross sectional study, effect of characteristics of individual healthcare professionals on stress levels was not taken in account. Our results may also be affected by unequal distribution of sample with respect to age. Also we used self-report questionnaire instead of clinical assessment which may also have affected our results. Also we had paucity of healthcare professionals and overall infrastructure to deal with such a situation that may have impact on the results. Finally our results can't be generalized to general population or other professionals.

5. CONCLUSION
Present study has highlighted need of preparedness of healthcare professionals in terms of coping styles to deal with such stressful situations which may come in future. Healthcare professionals should undergo special training to deal with such pandemics in future. There is also need of specific support group for healthcare professionals. Specific workshops can be designed for healthcare professionals to promote healthy coping styles to deal with the stress. Safeguarding the health care professionals is important and public health department should take steps to improve their physical and psychological wellbeing to deal with crisis coming in future.

Author Contributions
Shilpa Avinash Telgote: Concepts, Design, Definition of intellectual content, Literature search, Data acquisition, Data analysis, Manuscript editing, Manuscript review, Guarantor.
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Ajinkya Sureshrao Ghogare: Concepts, Design, Definition of intellectual content, Literature search, Data analysis, Manuscript editing, Manuscript review, Guarantor.

Conflict of Interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are presented in the paper.

REFERENCES AND NOTES

1. Alotaybi MS, Al-Mugti HS, Alosaimi MN, Alsabban AM, Al-Otaibi AF, Bugis OAA. Prevalence and determinants of stress among medical residents in ministry of National Guard, Saudi Arabia. Medical Science 2021; 25(110):868-881

2. Babore A, Lombardi L, Viceconti ML, Pignataro S, Marino V, Crudele M, Candelori C, Bramanti SM, Trumello C. Psychological effects of the COVID-2019 pandemic: Perceived stress and coping strategies among healthcare professionals. Psychiatry Res 2020; 293:113366.

3. Bagcchi S. Stigma during the COVID-19 pandemic. Lancet Infect Dis 2020; 20:782.

4. Binnwejim MS, Alhumade AS. Prevalence of psychological stress and adopted coping strategies among healthcare workers in King Saud medical city (KSMC). Medical Science 2021; 25(107):46-56

5. Cai H, Tu B, Ma J, Chen L, Fu L, Jiang Y, Zhuang Q. Psychological impact and coping strategies of frontline medical staff in hunan between January and march 2020 during the outbreak of coronavirus disease 2019 (COVID-19) in Hubei, China. Med Sci Monit 2020; 26: e924171.

6. Canestrari C, Bongelli R, Fermani A, Riccioni I, Bertolazzi A, Muzi M, Burro R. Coronavirus Disease Stress Among Italian Healthcare Workers: The Role of Coping Humor. Front Psychol 2021; 11:601574.

7. Carver CS, Scheier MF, Weintraub JK. Assessing coping strategies: a theoretically based approach. J Pers Soc Psychol 1989; 56:267.

8. Carver CS. You want to measure coping but your protocol'too long: Consider the brief cope. Int J Behav Med 1997; 4:92-100.

9. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. J Health Soc Behav 1983; 24:385–396.

10. Daniluk B, Borkowska A. Humor appreciation in elderly people and its cognitive determinants. Roczniki Psychologiczne 2017; 20:529-43.

11. Dijkstra MT, Homan AC. Engaging in rather than disengaging from stress: Effective coping and perceived control. Front Psychol 2016; 7:1415.

12. Eisenberg SA, Shen BJ, Schwarz ER, Mallon S. Avoidant coping moderates the association between anxiety and patient-rated physical functioning in heart failure patients. J Behav Med 2012; 35:253-261.

13. El-Hage W, Hingray C, Lemogne C, Yrondi A, Brunault P, Bienvenu T, Etain B, Paquet C, Gohier B, Bennabi D, Birmes P, Sauvaget A, Fakra E, Prieto N, Bulteau S, Vidailhet P, Camus V, Leboyer M, Krebs MO, Aouizerate B. Health professionals facing the coronavirus disease 2019 (COVID-19) pandemic: What are the mental health risks?. Encephale 2020; 46:S73-S80.

14. Flesia L, Fietta V, Colicino E, Segatto B, Monaro M. Stable psychological traits predict perceived stress related to the COVID-19 outbreak. J Clin Med 2020; 9:3350.

15. Folkman S, Lazarus RS. Coping as a mediator of emotion. J Pers Soc Psychol 1988; 54:466–475.

16. Folkman S, Lazarus RS. If it changes it must be a process: study of emotion and coping during three stages of a college examination. J Pers Soc Psychol 1985; 48:150.

17. Folkman S. Stress, coping, and hope. Psycho-oncology 2010; 19:901–908.

18. Greengross G. Humor and aging - a mini-review. Gerontology 2013; 59:448-53.

19. Hernandez SHA, Morgan BJ, Parshall MB. Resilience, stress, stigma, and barriers to mental healthcare in US Air Force nursing personnel. Nurs Res 2016; 65:481–486.

20. Hirsch JD, Nemlekar P, Phuong P, Hollenbach KA, Lee KL, Adler DS, Morello CM. Patterns of Stress, Coping and Health-Related Quality of Life in Doctor of Pharmacy Students. Am J Pharm Educ 2020; 84:7547.

21. Khalid I, Khalid TJ, Qabajah MR, Barnard AG, Qushmaq IA. Healthcare workers emotions, perceived stressors and coping strategies during a MERS-CoV outbreak. Clin Med Res 2016; 14:7–14.

22. Koh D, Lim MK, Chia SE, Ko SM, Qian F, Ng V, Tan BH, Wong KS, Chew WM, Tang HK, Ng W, Muttakin Z, Emmanuel S, Fong NP, Koh G, Kwa CT, Tan KB, Fones C. Risk perception and impact of Severe Acute Respiratory Syndrome (SARS) on work and personal lives of healthcare workers in Singapore: what can we learn? Med Care 2005; 43:676-82.

23. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, Wu J, Du H, Chen T, Li R, Tan H, Kang L, Yao L, Huang M, Wang H, Wang G, Liu Z, Hu S. Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. JAMA Netw Open 2020; 3:e203976.

24. Lee SM, Kang WS, Cho AR, Kim T, Park JK. Psychological impact of the 2015 MERS outbreak on hospital workers and quarantine hemodialysis patients.Compr Psychiatry 2018; 87:123–127.

25. Liu X, Kakade M, Fuller CJ, Fan B, Fang Y, Kong J, Guan Z, Wu P. Depression after exposure to stressful events: lessons learned from the severe acute respiratory syndrome epidemic. Comprensive Psychiatry 2012; 53:15–23.

26. Martínez JP, Méndez I, Ruiz-Esteban C, Fernández-Sogorb A, García-Fernández JM. Profiles of Burnout, Coping Strategies and Depressive Symptomatology. Frontiers in Psychol 2020; 11:591.

27. Matud MP. Gender differences in stress and coping styles. Pers Individ Differ 2004; 37:7.

28. Mickes L, Walker D, Parris J, Mankoff R, Christenfeld N. Who's funny: gender stereotypes, humor production, and memory bias. Psychon Bull Rev 2012; 19:108-12.

29. Minahan J, Falzarano F, Yazdani N, Siedlecki KL. The COVID-19 Pandemic and Psychosocial Outcomes across Age through the Stress and Coping Framework. Gerontologist 2021; 61:228-239.

30. Mondo M, Sechi C, Cabras C. Psychometric evaluation of three versions of the Italian Perceived Stress Scale. Current Psychol 2019; 1:9.

31. Mulfinger N, Lampl J, Dinkel A, Weidner K, Beutel ME, Jarczok MN, Hildenbrand G, Kruse J, Seifried-Dübon T, Junne F, Beschoner P, Gündel H. Psychological stress caused by epidemics among health care workers and implications for coping with the corona crisis: a literature review. Z Psychosom Med Psychother 2020; 66:220-242.

32. Müller MP, Hänsel M, Fichtner A, Hardt F, Weber S, Kirschbaum C, Eich C, Rudera S, Walchers F, Kocha T, Eiche C. Excellence in performance and stress reduction during two different full scale simulator training courses: a pilot study. Resuscitation 2009; 80:919–924.

33. Phua DH, Tang HK, Tham KY. Coping responses of emergency physicians and nurses to the 2003 severe acute respiratory syndrome outbreak. Acad Emerg Med 2005; 12:322–328.

34. Revise Sociology [Internet]. Religion and Age, Inc.; c2018-19 [updated 2018 Oct 08, cited 2021 Sep 30]. Available from:https://revisesociology.com/tag/belief/.

35. Selye H. The evolution of the stress concept. Am Scientist 1973; 61:692–699.

36. Sreelatha P, Premlal L, Ryali VS. Burnout and coping strategies among residents of a private medical college in South India: A cross-sectional study. Ind Psychiatry J 2018; 27:213-8.

37. Svebak S, Martin RA, Holmen J. The prevalence of sense of humor in a large, unselected county population in Norway: Relations with age, sex, and some health indicators. Humor 2004; 17:121-34.

38. Svebak S, Romundstad S, Holmen J. A 7-year prospective study of sense of humor and mortality in an adult county population: The HUNT-2 study. Int J Psychiatry Med 2010; 40: 125-46.

39. Tada A. The Associations among Psychological Distress, Coping Style, and Health Habits in Japanese Nursing Students: A Cross-Sectional Study. Int J Environ Res Public Health 2017; 14:1434.

40. Tam CWC, Pang EPF, Lam LCW, Chiu HFK. Severe acute respiratory syndrome (SARS) in Hong Kong in, 2003: Stress and psychological impact among frontline healthcare workers. Psychol Med 2004; 34:1197–1204.

41. Teasdale E, Yardley L, Schlotz W, Michie S. The importance of coping appraisal in behavioural responses to pandemic flu. Br J Health Psychol 2012; 17:44–59.

42. Tian F, Li H, Tian S, Yang J, Shao J, Tian C. Psychological symptoms of ordinary Chinese citizens based on SCL-90 during the level I emergency response to COVID-19. Psychiatry Res 2020; 288:112992.

43. Umucu E, Lee B. Examining the impact of COVID-19 on stress and coping strategies in individuals with disabilities and chronic conditions. Rehabilitation Psychology 2020; 65: 193-198.

44. Verma S, Mythily S, Chan YH, Deslypere JP, Teo EK, Chong SA. Post-SARS psychological morbidity and stigma among general practitioners and traditional Chinese medicine practitioners in Singapore. Ann Acad Med Singapore 2004; 33:743–748.

45. West CP, Dyrbye LN, Shanafelt TD. Physician burnout: contributors, consequences and solutions. J Intern Med 2018; 283: 516–529.

46. Woodhead L. Gender Differences in Religious Practice and Significance. Travail, genre et societies 2012; 27:33-54.

47. Yin H, Huang S, Lv L. A multilevel analysis of job characteristics, emotion regulation, and teacher well-being: a job demands-resources model. Frontiers in Psychol 2018; 9:2395.